

GRAPHING TECHNIQUES FOR SCIENCE

1. Identify the independent variable (x) and the dependent variable (y).
2. Label the x-axis with the independent variable. Show the units of measure in parentheses. Darken the line representing the x-axis.
3. Label the y-axis with the dependent variable. Show the units of measure in parentheses. Darken the line representing the y-axis.
4. Choose the scale for the x-axis. Make your graph as large as possible by spreading out the data on the x-axis. Each box along the x-axis must represent the same number of steps. Count by 1, 2, 5, 10 or the number you determine by dividing the range of the x values by the number of boxes in the x direction. Number the spaces along the x-axis.
5. Choose the scale for the y-axis. Make your graph as large as possible by spreading out the data on the y-axis. Each box along the y-axis must represent the same number of steps. You may use a different scale for the x-axis and the y-axis. Count by 1, 2, 5, 10 or the number you determine for the y-axis by dividing the range of the y values by the number of boxes along the y-axis. Number the spaces along the y-axis.
6. Plot a point for each set of data in the data table. All graphs do not go through the origin or the point (0,0). Decide if the data would logically include the point (0,0). If so, include the point (0,0) on your graph.
7. Decide if the points lie roughly in a straight line or a curve. Draw the best fit line or smooth curve for your data points. Do not connect the dots. Have the line or curve go through as many points as possible with approximately the same number of points above the line as below.
8. Title your graph. Title it in the order of independent variable versus dependent variable or "y versus x".

Below is a graph using good graphing techniques.

Name _____

Graphing Density

Here is a set of data collected in an experiment.

	Mass (g)	Volume (mL)
1.	14.0	5.0
2.	29.5	11.0
3.	46.0	17.0
4.	63.0	24.5
5.	38.0	14.0
6.	55.0	20.5
7.	81.0	30.0
8.	70.0	22.6
9.	102.0	38.5

Part I

1. Follow the steps for drawing a graph for Science. See # _____ in notebook.
Be sure to include all elements of the graph.
2. Remember that data collected in a lab can contain varying results due to experimental error.
3. Draw the best fit line for your data points.

Part II: Using the line of best fit, complete the following data table.

	Mass (g)	Volume (mL)
1.	_____	3.0
2.	15.0	_____
3.	29.0	_____
4.	_____	12.0
5.	_____	17.0
6.	63.0	_____
7.	81.0	_____
8.	_____	24.5
9.	98.0	_____

Questions:

1. Compare the numbers in Part I and Part II. Explain why the numbers are different.
2. Are your values in Part II the same as your partners? Why or Why not?

Part III

1. Choose two points on the best fit line. Circle the two points and label the points with an ordered pair. List the ordered pairs here.

Point #1 (____,____) Point #2 (____,____)

2. Calculate the slope of the line by using the coordinates of the two points. Show your work. Include units of measure. Record answer to one decimal place.

$$\text{Slope} = \frac{Y_2 - Y_1}{X_2 - X_1}$$

3. What does the slope of your graph represent? _____
4. What is the density of the object? _____
5. List the density obtained by six other students. Find the average of your density and the six others. Show your work.

Name _____

Finding the density of an unknown solid

Record the set of data collected in an experiment.

Object(s)	Mass (g)	Original Volume(mL)	Final volume(mL)	Volume by displacement(cm^3)

Part I

1. Follow the steps for drawing a graph for Science. See # _____ in notebook.
Be sure to include all elements of the graph.
2. Remember that data collected in a lab can contain varying results due to experimental error.
3. Draw the best fit line for your data points.

Analysis:

1. Choose two points on the best fit line. Circle the two points and label the points with an ordered pair. List the ordered pairs here.

Point #1 (____,____) Point #2 (____,____)

2. Calculate the slope of the line by using the coordinates of the two points. Show your work. Include units of measure. Record answer to one decimal place.

$$\text{Slope} = \frac{Y_2 - Y_1}{X_2 - X_1}$$

3. What does the slope of your graph represent? _____

4. What is the density of the object? _____

5. Identify the material based on its density.

Density Problems

The materials we worked with in our lab have the following densities:

.77 g/mL	Maple	.90 g/mL	Polypropylene
1.15 g/mL	Nylon	1.17 g/mL	Acrylic
1.23 g/mL	Polyurethane	1.32 g/mL	Phenolic
1.37 g/mL	PVC	2.2 g/mL	Teflon
2.71 g/mL	Aluminum		

- 1) Calculate the density of the following materials.
- 2) Identify the material.
- 3) Will the material sink or float in water?

1. Find the density of a sample with a mass of 15 grams and a volume of 10.9 mL.

2. Find the density of a material with a mass of 42.5 grams and a volume of 15.7 mL.

3. Find the density of a sample with a mass of 37.6 grams and a volume of 41.8 mL.

4. Find the density of a sample with a mass of 24.7 grams and a volume of 18.0 mL.

5. Find the density of an object with a mass of 44.4 grams and a volume of 38.3 mL.